

### REMARKS

Claims 1, 4-7, 9, 13-15 are currently amended. Claims 2-3, 8, 10, and 16-18 are currently cancelled and claims 19-27 are currently added. Claims 1, 4-7, 9, 11-15, and 19-27 are presently pending. The claim amendments and newly added claims are fully supported by the original specification and claims. For example, claim 1 has been amended, and similarly claims 7, 9, 13 and 15, to incorporate original claim 3, currently cancelled. Claim 1 now requires that the nucleotide encode a peptide that comprises SEQ ID NO:2, SEQ ID NO:8, SEQ ID NO:9, or SEQ ID NO:10. This amendment is supported also by the original specification at page 6, lines 5-14. The amendments to claims 6 and 14 are supported, for example, at page 4, lines 5-14 of the specification. The amendments to claims 4 and 5 were made for clarification purposes only, which amendments do not narrow the scope of claims, for example, the term "derived" was replaced with the term "isolated" and the phrase "involved in hydrolysis" with "that hydrolyzes." New claims 19-27 are dependent claims and are fully supported by the original claims. No new matter has been added by way of these amendments or new claims, such that their entry at this time is warranted.

Applicants appreciate the Examiner's acknowledgement that claims 3-5 have been deemed free of the prior art. As explained above, claim 3 has been cancelled and incorporated into claims 1, 7, 9 and 13. Therefore claims 1, 7, 9, 13 and the claims dependent thereon should also be free of the prior art for the same reasons. Furthermore, claim 15 is now dependent on claim 4 and therefore also free of the prior art.

Claim 14 was objected to for depending from itself. Claim 14 has been amended and is now dependent on Claim 13.

Claims 1-7 and 9-15 were rejected under 35 U.S.C. § 112, first paragraph, for lack of written description for the reasons set forth on pages 2-3 of the Office Action. Applicants traverse.

First, on page 2, last paragraph of the Office Action, the Examiner states that Applicants have described and taught a nucleotide isolated from coffee (SEQ ID NO:1) that encodes mannanase (SEQ ID NO:2), and further acknowledges that Applicants have described a fragment of the isolated nucleotide SEQ ID NO:1 (nucleotides 11 to 1294) that encode a functional mannanase. Claims 4, 5 and 15 are directed to a fragment of an isolated nucleic acid molecule isolated from coffee encoding a mannanase enzyme that comprises nucleotides 11 to 1294 of SEQ ID NO:1 or SEQ ID NO:1 and therefore in view of the Examiner's acknowledgement, would necessarily be enabled.

Furthermore, independent claims 1, 7, 9, 13, and the claims dependent thereon, also meet the written description requirement. These claims as amended now provide significant structural (isolated from coffee and nucleotide encodes a peptide comprising SEQ ID NO:2, SEQ ID NO:8, SEQ ID NO:9 or SEQ ID NO:10) and functional (encodes enzyme that hydrolyzes polysaccharides having pure or branched mannan molecules linked to each other via a  $\beta(1\rightarrow4)$ ) description, which is sufficient that one skilled in the art would recognize from the originally filed disclosure that Applicants were in possession of the presently claimed invention.

Finally, newly amended claim 6 and the claims dependent therefrom also meet the written description requirement. Claims 6 is now directed to an isolated nucleic acid molecule comprising a nucleic acid molecule having at least 90% homology with SEQ ID NO:1 (structure), wherein the nucleic acid molecule is isolated from a coffee cell (structure) and encode a functional beta-endo-mannanase (function). From the specification on page 4, lines 5-14 of the specification, one skilled in the art would understand that 90% homology is determined by the ratio between the number of bases of a homologous sequence that are identical to those of a sequence SEQ ID NO:1 and the total number of bases of the sequence according to the invention. One skilled in the art would reasonably believe that applicants were in possession of the invention at the time of filing based on the structural and functional limitation in presently amended claim 6. Furthermore, one skilled in the art would understand that there are natural variations in nucleotide sequence due to, for example, "wobble pairs" or transcriptions errors, which typically do not even effect the translation product. Even when the translation effects the translation product, it is usually not significant and does not change the function of the enzyme substantially. The claims have now been amended to narrow the scope of the claims to a genus having the structural and functional characteristics of the coffee endo-beta-mannanase nucleotide isolated by applicants, while taking into account these natural variations.

In view of the above, Applicants respectfully request that the rejection for lack of written description be removed.

Claims 1-7 and 9-15 were rejected under 35 U.S.C. § 112, first paragraph, for lack of enablement. The Examiner states, on page 3, last paragraph of the Office Action, that claims 1-7 and 9-15 lack enablement because the application does "not reasonably provide enablement for an isolated nucleic acid derived from coffee encoding a (1 $\rightarrow$ 4)-beta-mannan endohydrolase involved in hydrolysis of polysaccharides that comprise pure or branched

mannan molecules linked by beta 1-4 linkages, an isolated nucleic acid molecule that is homologous to and hybridizes to the nucleic acid of SEQ ID NO:1, fragments thereof, and plants comprising said polynucleotides."

The newly amended claims require that the nucleotide be isolated from coffee and require that the nucleic acid molecule encode at least one enzyme that hydrolyzes polysaccharides having pure or branched mannan molecules linked to each other via  $\beta(1\rightarrow4)$  linkage. The claims further require that the nucleic acid (1) encode a peptide comprising SEQ ID NO:2, SEQ ID NO:8, SEQ ID NO:9, or SEQ ID NO:10 (independent claims 1, 7, 9 and 13); (2) comprise a nucleic acid molecule having at least 90% homology with SEQ ID NO:1 (independent claim 6); or (3) comprise nucleotides 11 to 1294 of the nucleic acid sequence (independent claim 4).

The present specification provides teaching of how to isolate a coffee mannanase enzyme having the structure as presently claimed. On pages 9-17, Applicants provide a detailed example of the isolation of coffee endo-beta-mannanase and suggested methods of isolating other endo-beta-mannanase encoding nucleotides from coffee cells. Further, Applicants provide detailed structure of the isolated endo-beta-mannanase encoding nucleotide and encoded functional peptide. On page 15, Applicants provide examples of probes, *e.g.*, MAN3, useful in isolating the nucleotide sequence encoding the coffee mannanase. Other probes may be developed by one skilled in the art, based on SEQ ID NO:1 or probes based on a nucleotide sequence corresponding to the amino acid sequences of SEQ ID NO:2. In view of the newly amended claims, now reciting specific structural and functional requirements, one skilled in the art would be able to use the methods taught to isolate from coffee cells, nucleotides that encode endo-beta-mannanase having the specific structural requirements of the claims.

While some experimentation is required, one skilled in the art, with Applicants' teachings and structural disclosure, would be able to practice the invention as presently claimed without undue experimentation. Applicants therefore request that these rejections be withdrawn.

Claims 1-5, 9-13, and 15 were rejected under 35 U.S.C. § 112, second paragraph, for the reasons set forth on pages 6-7 of the Office Action.

The term "derived" has now been replaced by the term "isolated" in claims 1 and 4; the term "involved" has now been deleted from claims 1, 4, 9, and 13; and the

dependence of claim 15 on claim 1 has now been changed to depend on claim 4. In view of these amendments, these rejections are no longer applicable and should be withdrawn.

Claims 1-2, 6-7, 9, 10, and 12-15 were rejected under 35 U.S.C. § 102(b) as being anticipated by Jorsboe M. *et al.*, WO 97/20937 published June 12, 1997, for the reason set forth on pages 7-8 of the Office Action. Applicants traverse.

Jorsboe teaches a vector comprising an alpha-glucosidase from coffee and plants transformed therewith. The newly amended claims require that the isolated nucleic acid from coffee either (1) encodes a peptide comprising SEQ ID NO:2, SEQ ID NO:8, SEQ ID NO:9 or SEQ ID NO:10; or (2) comprises a nucleic acid molecule having at least 90% homology with SEQ ID NO:1.

In view of the fact that Jorsboe doesn't even teach or disclose a nucleotide sequence that encodes an endo-beta-mannanase, and more specifically fails to teach SEQ ID NOS:2 and 8-10 or a nucleotide having 90% homology with SEQ ID NO:1, Applicants respectfully request that this rejection be withdrawn.

Claims 1-2, 6-7 and 13-14 were rejected under 35 U.S.C. § 102(b) as being anticipated by Christgau S. *et al.*, U.S. Patent No. 5,795,764, for the reason set forth on page 8 of the Office Action. Applicants traverse.

Christgau teaches a cDNA encoding an enzyme having mannanase activity, but like Jorsboe, Christgau fails to teach or disclose an isolated nucleic acid from coffee that either (1) encodes a peptide comprising SEQ ID NO:2, SEQ ID NO:8, SEQ ID NO:9 or SEQ ID NO:10; or (2) comprises a nucleic acid molecule having at least 90% homology with SEQ ID NO:1. Without either of these teachings, Christgau cannot anticipate the Applicants' presently claimed invention. Therefore, all of the claims are free from the teachings of Christgau and the rejection should also be removed.

Claims 1-2, 6-7 and 13-14 were rejected under 35 U.S.C. § 102(b) as being anticipated by GenBank Accession number AF017144 submitted August 5, 1997 for the reason set forth on pages 8-9 of the Office Action. Applicants traverse.

The nucleotide disclosed in GenBank Accession number AF017144 is a cDNA encoding a (1→4)-beta-mannan endohydrolase from the seeds of germinated tomato, not coffee as required by the claims. Furthermore, the disclosed sequence does not encode a peptide comprising SEQ ID NO:2, SEQ ID NO:8, SEQ ID NO:9, or SEQ ID NO:10. The sequence disclosed by GenBank Accession number AF017144 also does not disclose a nucleic acid molecule having at least 90% homology with SEQ ID NO:1. In view of these

facts, GenBank Accession number AF017144 cannot anticipate the presently claimed invention and the rejection should be withdrawn.

Claims 1-2, 6-7 and 9-15 were rejected under 35 U.S.C. § 103(a), as being obvious over Jorsboe *et al.*, WO 97/20937 published June 12, 1997, in view of Stiles J. WO 98/06852 published February 19, 1998, for the reasons set forth on pages 9-10 of the Office Action. Applicants traverse.

As discussed above, Jorsboe teaches a vector comprising an alpha-glucosidase from coffee and plants transformed therewith. Jorsboe teaches how to break beta 1→4 linkage, but the linkage is not between the same molecules (not between pure or branched mannan molecules). Furthermore, Jorsboe fails to teach a sequence encoding a peptide comprising SEQ ID NO:2, SEQ ID NO:8, SEQ ID NO:9, or SEQ ID NO:10 or a sequence having at least 90% homology with SEQ ID NO:1.

Stiles fails to remedy the deficiencies of Jorsboe. Stiles teaches transformation of coffee plants, but does not disclose or suggest the presently claimed invention in general or the specific nucleotide sequences.

Consequently, combining the teachings of Jorsboe and Stiles does not teach or disclose an isolated nucleic acid from coffee that either (1) encodes a peptide comprising SEQ ID NO:2, SEQ ID NO:8, SEQ ID NO:9 or SEQ ID NO:10; or (2) comprises a nucleic acid molecule having at least 90% homology with SEQ ID NO:1. Without this, Jorsboe and Stiles, alone or in combination, cannot make the presently claimed invention obvious. Applicants therefore request that this rejection be removed.

Accordingly, the entire application should be in condition for allowance, early notice of which would be appreciated. Should the Examiner not agree with the Applicants' position, then a personal or telephonic interview is respectfully requested to discuss any remaining issues and expedite the eventual allowance of the application.

Respectfully submitted,

Date

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Rodney J. Fuller  
For: Allan A. Fanucci

(Reg. No. 46,714)  
(Reg. No. 30,256)

**WINSTON & STRAWN**  
**Customer Number: 28765**

(202) 371-5838